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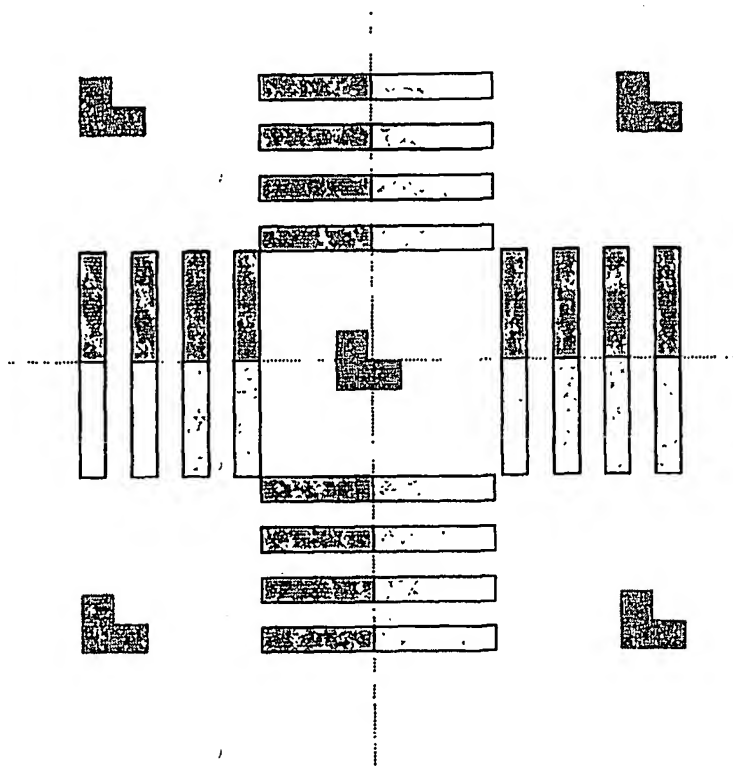
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(54) Title: OVERLAY METROLOGY MARK



(57) Abstract: An overlay metrology mark for determining the relative position between two or more layers of an integrated circuit structure comprising a first mark portion associated with and in particular developed on a first layer and a second mark portion associated with and in particular developed on a second layer, wherein the first and second mark portions together constitute, when the mark is properly aligned, at least one pair of test zones, each test zone comprising a first mark section formed as part of the first mark portion and a second mark section formed as part of the second mark portion each comprising a plurality of elongate rectangular mark structures in parallel array adjacently disposed to form the said test zone such that the mark structures in each test zone are in alignment in a first direction within the test zone but are substantially at 90° with respect to the mark structures of at least one other test zone in alignment in a second direction, and wherein the test zones making up the or each pair are laterally displaced relative to each other along one of the said directions. A method of marking and a method of determining overlay error are also described.

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B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

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Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the International search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, IBM-TDB

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 02/19415 A (KLA TENCOR CORP) 7 March 2002 (2002-03-07) page 1, lines 9-23	1-26
X	page 11, lines 12-30	12-15
X	page 11, lines 32,33	4
X	page 14, line 18 - page 15, line 19	7
X	page 16, lines 5-11	5,6
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X	page 23, line 4 - page 24, line 16	
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X	page 30, line 32 - page 31, line 5; figure 8	
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X	page 36, line 18 - page 39, line 17; figure 12	1-3, 8-14, 16-18,20
X	page 43, line 13 - page 45, line 3; figure 17	
X	page 46, line 16 - page 47, line 11; figures 19-22	21-26
X	page 50, lines 7-20	23
X	page 55, line 31 - page 56, line 8	14
X	WO 02/18871 A (KLA TENCOR CORP) 7 March 2002 (2002-03-07) page 1, line 15 - page 2, line 33 page 4, lines 13-33 page 5, line 3 - page 6, line 14; figure 1 page 7, line 26 - page 8, line 26 page 9, lines 19-22 page 10, line 31 - page 11, line 13; figure 2 page 12, line 25 - page 15, line 20; figure 4	1-7, 11-26
X	EP 0 818 814 A (KLA INSTR CORP) 14 January 1998 (1998-01-14) column 1, lines 1-35 column 2, lines 5-9 column 3, lines 42-58 column 4, line 11 - column 5, line 32; figure 1b column 8, line 7 - column 10, line 19; figure 4 column 11, lines 21-25	1-7, 11-26
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INTERNATIONAL SEARCH REPORT

In International Application No
PCT/GB2004/001536

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 4 343 878 A (CHIANG PING-WANG) 10 August 1982 (1982-08-10) column 1, lines 12-36, 47-55 column 1, line 65 - column 2, line 17 column 2, line 53 - column 3, line 34 column 13, line 38 - column 16, line 16; figures 11-20 column 16, line 46 - column 17, line 62; figure 29 -----	1-26
A	US 2001/019401 A1 (ISHIMARU KATSUAKI ET AL) 6 September 2001 (2001-09-06) paragraphs '0001!', '0002!', '0015! paragraphs '0083! - '0087!; figures 4,9 -----	1-26

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No
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Patent document cited in search report		Publication date	Patent family member(s)	Publication date
WO 0219415	A	07-03-2002	EP 1314198 A1	28-05-2003
			JP 2004508711 T	18-03-2004
			WO 0219415 A1	07-03-2002
			US 2003021465 A1	30-01-2003
			US 2003021466 A1	30-01-2003
			US 2003026471 A1	06-02-2003
			US 2003021467 A1	30-01-2003
WO 0218871	A	07-03-2002	US 6486954 B1	26-11-2002
			EP 1328774 A1	23-07-2003
			JP 2004507901 T	11-03-2004
			WO 0218871 A1	07-03-2002
EP 0818814	A	14-01-1998	US 6023338 A	08-02-2000
			EP 0818814 A2	14-01-1998
			US 6079256 A	27-06-2000
US 4343878	A	10-08-1982	NONE	
US 2001019401	A1	06-09-2001	JP 2001318470 A	16-11-2001
			TW 529078 B	21-04-2003